

LOW WORK FUNCTION MATERIAL

CROSS-REFERENCE TO RELATED APPLICATIONS

5 The present application is a continuation-in-part of United States Patent
Application Serial No. 10/005,989 filed December 5, 2001, ^{new Patent No. 6,885,622} which claims priority to
United States Provisional Patent Application Serial No. 60/254,374 filed December 8,
2000.

TECHNICAL FIELD

10 The present invention relates in general to field emission devices, and in
particular to field emission devices comprising carbon nanotubes.

BACKGROUND INFORMATION

15 Carbon films, including carbon nanotube (CNT) materials, are being
developed for cold cathode applications. These applications include field emission
displays, x-ray tubes, microwave devices, CRTs, satellite thrusters, or any
applications requiring a source of electrons. There are many types of carbon films
that are being considered. The emission mechanism believed to be responsible for the
emission of electrons from these carbon films is the Fowler-Nordheim theory; this is
20 especially true for the carbon films that are conducting. Included in this emission
mechanism is an electrical barrier at the surface of the conductor that prevents
electrons from exiting the metal. However, if a strong field is applied, this barrier is
lowered or made thin such that electrons can now "tunnel" through the barrier to
create a finite emission current. The height of this barrier is partially determined by